Both aluminium and silicon possess a property which manganese does not, and which is very much valued for a certain purpose, i.e., they hold gases dissolved in the metal in solution, so that these are retained on solidification. Aluminium was formerly frequently brought into use in large amounts in the manufacture of soft steel; on this ground during casting, small pieces thereof were thrown into the moulds, and as a consequence made metal rich in gas quieter. This dodge, nevertheless, does not require to be employed for the open-hearth process, since one is in the position, by means of correct slag composition and deoxidation by manganese alone, to produce metal poor in gas, so that one needs to employ costly aluminium only for special objects, and then only in small amounts.

(R) EECARBUKISATION.

The deoxidised metal must finally be given the desired properties, of which the most important is the right degree of hardness. The hardness*of the metal is in the main specified by the carbon content, which, therefore, must each time be introduced proportionately to the desired quality. As stated frequently already, all the remaining reducing agents can be eliminated in the open-hearth furnace before the carbon, so that it appears possible to break off the process at the desired carbon content, and thereby make recarburisation generally capable of being dispensed with. It is unfortunately not always possible to regulate the composition of the slag so exactly that it is exhausted of oxygen precisely at the moment desired, and one more often permits the metal to become lower in carbon, and therefore recarburisation must be resorted to. The same is usually only needed to a small extent, and admits of being accomplished by means of small quantities of spiegeleisen, or low phosphorous pig iron, and one is able to produce steels of the hardest kinds by these means without being obliged to carbonise by means of large quantities of spiegeleisen, or nearly pure carbon (Derby process).

Often other substances must be added to the metal for